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The Effectiveness of Augmented Reality Based On Assemblr Edu To Increase Learning Interest And Student Learning Outcomes

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Abstract

The purpose of this study is to analyze the effectiveness of Assemblr Edu-based augmented reality in increasing student interest and learning outcomes. The research design used is nonequivalent control group design. The technique that will be used in this study is simple random sampling. The results showed that Assemblr Edu-based augmented reality media is very valid so it is worth using in learning. The learning interest of students measured through questionnaires has increased which is calculated using N-Gain of 0.31 which is included in the moderate category. The learning outcomes of the experimental class learners measured through the reasoned multiple-choice test also addressed an increase calculated using an N-Gain of 0.50 which belongs to the moderate category. The conclusion of this study is that augmented reality media based on Assemblr Edu is effective for increasing students' interest in learning and learning outcomes in human excretion system materials.

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INTRODUCTION

Learning activities need to be held interactively, inspiringly, fun, and challenging so that students can actively participate, have creativity, and independence. This is in accordance with the Minister of Education and Culture Number 22 of 2016 which regulates the Standards for the Primary and Secondary Education Process. Students' interest in learning is one of the very important factors for the learning success of students (Pratiwi, 2017), where this interest in learning can arise from within the learners themselves (Yunitasari & Hanifah, 2020). In addition to the interest in learning, student learning outcomes also need to be considered to be able to motivate students in learning.

Learning outcomes are a benchmark for student success at the end of the learning process (Berutu & Tambunan, 2018). Student learning outcomes need to be considered to find out the extent of the material that can be accepted and understood by students in the learning process. One of the subjects that pay attention to the interest in learning and learning outcomes of students is the subject of science.

Natural Science is a science that providesfreedom for students to be able to develop themselves into quality humans who are proactive in responding to the challenges of the times (Baharuddin *et al*., 2017). However, in the real learning process, not a few students do not fully understand the science material being taught so that many students have a low interest in learning and the final score tends to be less good. Some of the factors that affect the science learning process that cause low interest in learning and student learning outcomes according to Sudjana (2009) include, the methods used by teachers are less varied, enthusiasm and interest of students in learning science is low, the learning environment conditions are less supportive, and the lack of learning media used. This is in line with the opinion of Baharuddin *et al*. (2017) , which states that the monotonous learning process, there has been no variation, as well as the lack of effort from the teacher to provide concepts and principles that can be accepted by learners in a real way, make science subjects into boring subjects and not easy to understand.

One of the science materials that is not easy for students to understand is the excretion system material (Pada *et al*., 2021). Excretion system material requires more understanding compared to other materials because the topic of discussion of this material is one of the subjects that has basic concepts that are quite abstract and there are complicated processes so that they are not easy to understand (Pada *et al*., 2021). This is a factor that results in interest in learning and learning outcomes in students in low excretion system materials.

The results of interviews that have been conducted with science teachers at SMP Negeri 7 Semarang, show that students have low interest in learning and learning outcomes in the excretion system material. Due to the Covid-19 pandemic, the learning process that began to use *smartphones* caused students to not pay proper attention to the subject matter, where there were still many students who opened other applications when *smartphones* were used in the learning process. The application features that are opened during the learning activity process are not only 1 application, for example, students open *google classroom* while playing *games* or open *google classroom* while opening social media. This has resulted in many students not making maximum use of their respective *smartphones* in the learning process so that students' interest in learning decreases (Hudaya, 2018). The use of learning media that is less varied in the material of the excretion system is also one of the factors that affect the low learning outcomes of students which is shown with 50% of students not meeting the standard of minimum completeness.

The interest in learning and learning outcomes in students in the excretory system material can be increased, one of which is by using good learning media. One of the learning media that supports the science learning process that can provide experience to students is 3D visual media (Yuliono & Rintayati, 2018). 3D visual media is one type of media that can be seen from various directions (Kurniawan et al., 2019). Augmented reality is one of the 3D visual media with application technology innovations that are useful in the learning process by combining data between the real world and the virtual world in two-dimensional and / or three-dimensional form which is projected in a real environment (real time) at the same time (Mustaqim, 2017). In this study, augmented reality will be simulated with the help of the Assemblr Edu application.

The Assemblr Edu application is one of the applications that carries the theme of augmented reality which can be downloaded on smartphone android and ios on playstore and appstore for free. This is in accordance with the current situation, where the Covid-19 pandemic has made smartphones the main media in learning, especially distance learning. The Assemblr Edu

application is a combination of Lego and Pokemon GO which is designed to help users in creating 3D content visualized in the form of augmented reality (Ryza, 2017). The Assemblr Edu application is not only used as a tool in the application of augmented reality, but can also be used as a learning medium that can contain subject matter, videos, images, messages, and links about the subject matter.

Based on research that has been carried out, learning using augmented reality learning media can improve learning outcomes and student interest in learning. In this study, research will be conducted on the effectiveness of augmented reality based on the Assemblr Edu application. So that by using these learning media, it is hoped that the interest in learning and learning outcomes of students can increase in the material of the excretion system. The augmented reality learning provision based on the Assemblr Edu application can be used as an alternative in the delivery of excretory system material to increase interest in learning and student learning outcomes in the research to be carried out. So that the title of this study is "The Effectiveness of Assemblr Edu-Based Augmented Reality to Increase Learning Interest and Student Learning Outcomes".

METHOD

The research design used in this study is *quasi-experimental* which uses *a nonequivalent control group design*, which is a research design that uses experimental groups and control groups that are not randomly selected (Sugiyono, 2019). In this design, to find out the initial state in the experimental group and control group, *a pretest* was used first. The design of the research carried out is presented in Table 1.

Tabel 1. Research Design

Group	*Pretest*	Treatment	*Posttest*
Experiment	O_1	X	O_2
Control	O_3	Y	O_4

(Sugiyono, 2019)

Information:

O_1 = pretest experimental class
O_2 = posttest experimental class
O_3 = *pretest* control class
O_4 = *posttest* control class
X = learning using *Assemblr* Edu-based *augmented reality* media
Y = learning using *PowerPoint* media

The research was conducted at SMP Negeri 7 Semarang. The population used is all students of class VIII of SMP Negeri 7 Semarang. The sampling technique used in this study was *simple random sampling*. The homogeneity test was carried out using UAS Class VIII score data for the odd semester of the 2021/2022 school year. The sampling process obtained two classes, class VIII A as an experimental class of 32 people, and class VIII B as a control class of 32 people. The data collection method in this study used the questionnaire method and the test method. Questionnaires and tests are carried out at the beginning and end of learning. The results of the study were then analyzed with the help of Microsoft Excel and SPSS 26.0.

RESULT AND DISCUSSION

The validity of *the Assemblr* Edu-based *augmented reality* provision is determined by the validation results of media experts with a total of 3 validators, with details of 2 integrated science lecturers FMIPA UNNES and 1 teacher who teaches science subjects at SMP Negeri 7 Semarang. Based on the results of the validity analysis, it was found that *Assemblr* Edu-based *augmented reality* media was included in the very valid criteria, meaning that the media was very good and very suitable for use for students and teachers during the learning process with a percentage of 94.72%.

The final data analysis begins with a normality test to determine the distribution of data. The normality test criterion is that H_0 is accepted if the sig > 0.05. The results of the questionnaire normality test and the tests obtained showed that the data were normally distributed and then continued with further tests, namely the T-Test test. The T-Test was carried out to determine the influence of the application of *Assemblr* Edu-based *augmented reality* media. The criterion for the T-Test test is that H_0 is accepted if the sig (2-tailed) < 0.05. The t-test result in the posttest experimental class was 0.000 < (0.05), then H_0 was rejected and Ha was accepted. Based on these results, it can be concluded that there are better differences in the application of *Assemblr* Edu-based *augmented reality* media to student interest in learning and learning outcomes. The results of filling out the questionnaire for interest in learning in the experimental class can be seen in Figure 1.

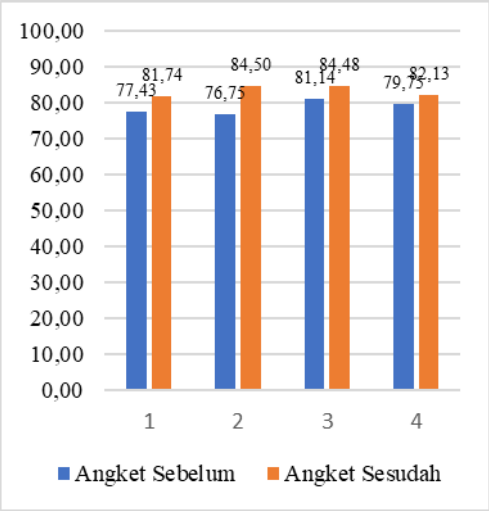

Figure 1. Achievement of Learners' Learning Interest in Each Indicator of the Experimental Class

The results of the questionnaire sheet show that there is an increase in learning interest in the use of augmented reality media based on Assemblr Edu and PowerPoint, which can be seen in Figure 1. This is in accordance with the results of research during the learning process using media, students feel interested and have a willingness to learn, so that learning outcomes can improve. This is in line with the results of Sunami & Aslam's research (2021), which states that interesting learning media are able to make students interested, active, and can increase students' interest in learning.

The first indicator of interest in learning in the study is a feeling of pleasure. The provision of questionnaires before and after the learning process using Assemblr Edu-based augmented reality media in the experimental class and PowerPoint media in the control class on the indicator of feelings of pleasure has increased. The average interest in learning on the experimental class's feelings of pleasure indicator increased from 77.43 to 81.74. These results show that the application of Assemblr Edu-based augmented reality media is responded to by both students and students feel happy when learning takes place. When learning using Assemblr Edu-based augmented reality media makes students very happy. Aryani et al. (2019), the use of augmented reality media makes students feel very enthusiastic and happy in following the learning process.

The second indicator of interest in learning in this study is the interest of learners. The provision of questionnaires before and after the learning process using Assemblr Edu-based augmented reality media on indicators of student interest has increased on average from 7 6.75 to 8 4.50. Students feel very interested in learning using Assemblr Edu-based augmented reality media. According to Aryani et al. (2019) a sense of interest is the beginning of an individual taking an interest, so that students who are interested will be interested in the learning process first. Learning on the material of the human excretion system in the form of augmented reality based on Assemblr Edu makes students more interested in studying the organs of the human excretory system. Students are also more active in asking questions during learning and when discussions are carried out.

The third indicator of interest in learning in this study is the attention of learners. The provision of questionnaires before and after the learning process using Assemblr Edu-based augmented reality media on student attention indicators increased on average from 81.14 to 84.48. According to Eliyarti & Rahayu (2021) student attention is the concentration of students in participating in learning by leaving aside other things. During the learning process and discussion using augmented reality media based on Assemblr Edu, students pay good attention to learning. This can be seen during learning, students are very focused on simulating the use of medi augmented reality based on Assemblr Edu. In addition, when the teacher explains the material and tasks given, students also pay close attention and carry out orders in accordance with the instructions given by the teacher.

The fourth indicator of interest in learning in this study is the involvement of learners. The provision of questionnaires before and after the learning process using Assemblr Edu-based augmented reality media on indicators of student engagement has increased on average from 79.75 to 85.13. Students who do augmented reality simulations can understand the learning delivered by the teacher well, because the appearance given to augmented reality looks real. Fendi (2019), students involved in simulation activities will be more active during learning. The involvement of students during the learning process is carried out, it can be seen when students answer questions from the teacher without having to be appointed first. In addition, during the discussion process, students also gave their own opinions when conducting augmented reality simulations based on Assemblr Edu in groups.

Overall, every indicator of student interest in learning using Assemblr Edu-based augmented reality media has increased. The highest increase in interest in learning in experimental classes is found in the indicators of student interest. Students are more interested in learning that uses Assemblr Edu-based augmented reality media featuring visul, images, and 3D animations that can attract attention and trigger student curiosity. This is in line with the research conducted by Sylvia et al. (2021), which states that the Assemblr Edu application can support the learning of higher-order thinking skills in students who are assisted by augmented reality features in it. Based on the NGain test, the NGain value in the experimental class was 0.31 which was included in the medium category. Meanwhile, the NGain score in the control class was 0.13 which was included in the low category. These results showed that the increase in interest in learning students in the experimental class was higher than that of the control class. The application of Assemblr Edu-based augmented reality media in the experimental class obtained criteria quite effective to apply compared to the application of PowerPoint media to control classes that fall under the ineffective criteria. Students who have a high interest in learning, can certainly support themselves to achieve other learning competencies.

The results of the significance test of cognitive learning outcomes of learners showed that there was a difference in the average posttest data between the experimental class and the control class. The average pretest score obtained by the experimental class was 65.21 and the average pretest score of the control class was 71.90. While the posttest result of the experimental class was 82.56 and the posttest result of the control class was 78.13. The average score of cognitive learning outcomes of the experimental class was higher compared to the control class. The difference in learning outcomes is due to differences in the treatment given as the learning progresses. The experimental class uses Assemblr Edu-based augmented reality media while the control class uses PowerPoint media without animation.

Assemblr Edu-based augmented reality media can help learners to more easily understand the material of human excretion systems. This is shown when the learning process takes place, students are given the opportunity to learn in real time how the organs of the human excretory system form through augmented reality. Acesta & Nurmaylany (2018), students who use augmented reality media, not only see the shadow of the appearance of organs in an abstract way so that students can understand the material well because the 3-dimensional image looks clearer and seems to be real.

Students conduct discussions and simulations of the use of augmented reality in the LDPD that has been compiled. Students also get a real picture of the organs of the human excretory system in the simulation. The questions presented in the LDPD aim to deepen the knowledge of learners regarding the material of the human excretion system being studied. The answer to the question is then made a conclusion and presented by each group. However, in reality there are still some students who do not follow the learning well, due to the presence of unstable networks. This makes students who experience obstacles feel that learning is complicated and difficult to understand. Learners who have a good network find learning fun and easy to understand. The discussions and simulations carried out help students to understand the material of the human excretion system. Improved cognitive learning outcomes of learners were analyzed using N-Gain from the average results of pretest and posttest scores. Pretests and posttests of experimental classes are carried out before and after students get learning treatment using Assemblr Edu-based augmented reality media. The average results of the pretest and posttest between the experimental class and the control class showed that the experimental class was higher compared to the control class. The calculation of the N-Gain value between the experimental class and the control class shows that the N-Gain of the experimental class is higher with a value of 0.5 which falls into the medium category and the N-Gain of the control class of 0.22 which falls into the low category. These results showed that the improvement in cognitive learning outcomes of the experimental class was higher than that of the control class.

There are several factors that can affect the learning outcomes of each learner according to Siang et al. (2020) among others: 1) internal factors or factors derived from within the learner, including the abilities possessed, such as interests and attention, learning attitudes and habits, learning motivation, physical and psychic factors, perseverance, socioeconomic, 2) external factors or factors that come from outside the learner or environmental factors, such as the teacher's ability to teach, the system of selecting

learning methods or models, as well as the creation of effective and efficient learning conditions.

The results of the analysis of cognitive learning outcomes of students showed a positive influence on student learning outcomes and experienced an increase that fell into the moderate category after using Assemblr Edu-based augmented reality media. These results are supported by research conducted by Ervana & Martini (2019), where augmented reality media can increase motivation and learning outcomes of students. Sugiarto (2021) in his research stated that augmented reality media in Assemblr Edu can increase students' understanding of the circulatory system material so that students are motivated to learn.

Students who have a high interest in learning, will follow the learning well and the level of understanding of students increases (Nursalam, 2007). Based on the results of the study, students' interest in learning has increased which is included in the moderate category after participating in learning using Assemblr Edu-based augmented reality media. Students who have a moderate interest in learning, are able to explain concepts, relate concepts between concepts, but have not been able to see the relationship between questions (Komariyah et al., 2018).

Overall, the use of Assemblr Edu-based augmented reality media has some advantages. First, augmented reality media can combine two-dimensional or three-dimensional virtual objects into a real environment and then projected in real time packaged in the form of an Assemblr Edu application. Secondly, the animation displayed is clearly visible. Third, students are given experience to simulate the direct use of media based on the Assemblr Edu application. Fourth, it can maximize the use of smartphones in learning.

CONCLUSION

Based on the results of research that has been carried out at SMP Negeri 7 Semarang, it can be concluded that the learning of using Assemblr Edu-based augmented reality media is effective in increasing the interest in learning and learning outcomes of students compared to PowerPoint media which is reviewed from the N-Gain analysis of learning interests and student learning outcomes which falls into the medium category, while the control class N-Gain falls into the low category.

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